Ecological Indicators and Habitat Characterization in Colorado and Lavaca River Basins

BIO-WEST

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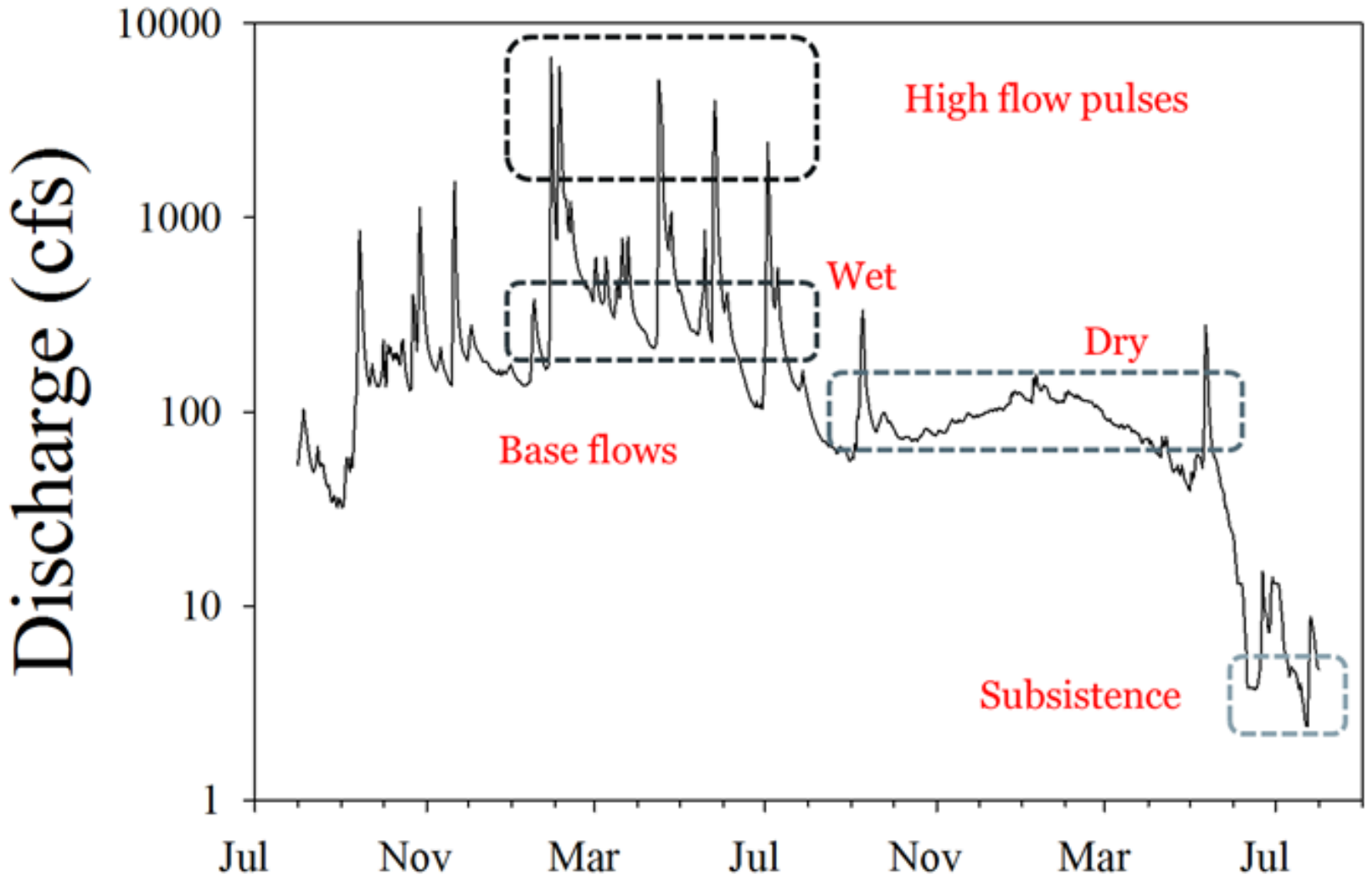
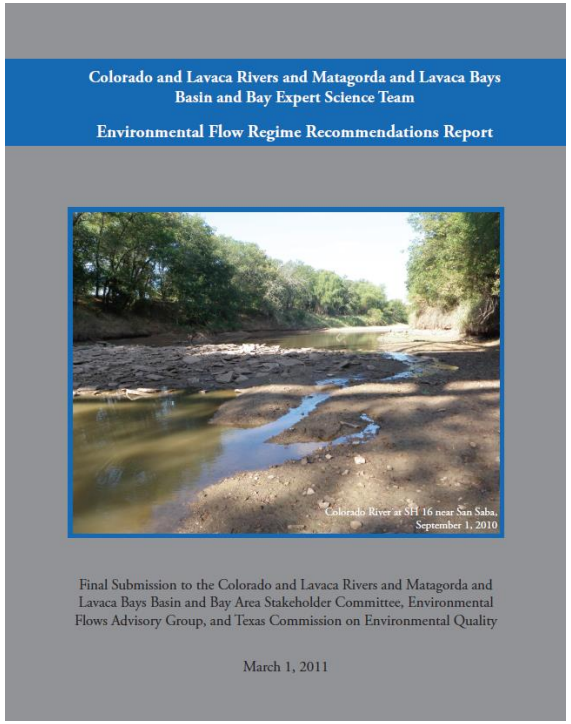
Natural Flow Paradigm





Environmental Flows
Recommendation Report

The Colorado and Lavaca Basin and Bay Area Stakeholder Committee

August 2011

SUBCHAPTER D: COLORADO AND LAVACA RIVERS, AND MATAGORDA AND LAVACA BAYS
§§298.300, 298.305, 298.310, 298.315, 298.320, 298.325, 298.330, 298.335, 298.340
Effective August 30, 2012

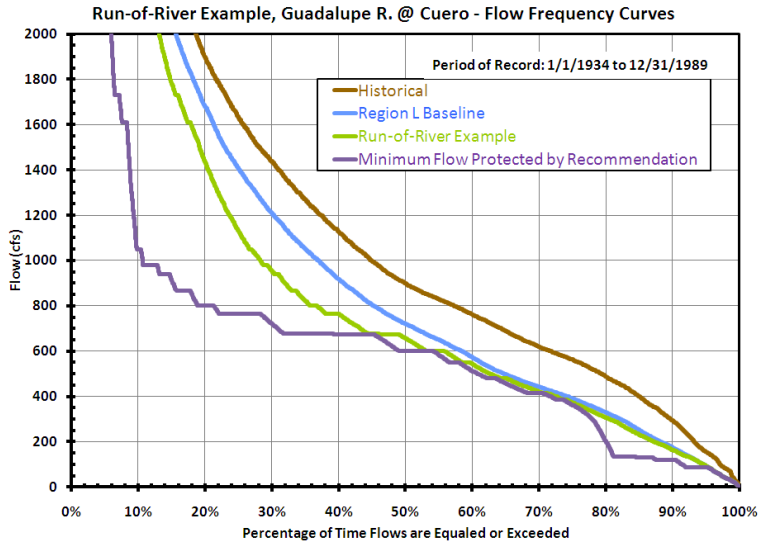
Sound ecological environment (SEE)

- sustains the full complement of native species in perpetuity
- sustains key habitat features required by these species
- retains key features of the natural flow regime required by these species to complete their lifecycles
- sustains key ecosystem processes and services, such as elemental cycling and the productivity of important plant and animal populations.

Study Goal: Validate Environmental Flow Recommendations and Standards in Texas

- Question: are recommendations and standards adequate or not (too little flows or too much) to maintain SEE?

- Challenges:
  - Flow standards not fully implemented
  - Maintain statistical rigor (replication based on proportion of flow)



Study Goal: Validate Environmental Flow Recommendations and Standards in Texas

- Refined questions: are predicted biological responses associated with components (i.e., flow tiers) of the recommendations/standards?
- Methodology: GSA, BRA (2014 – 2015)
- Monitored USGS Station
- Biological responses: fish, invertebrates, aquatic habitats, riparian communities

Aquatic Studies

Site	Season	Tier	BBEST	BBASC	TCEQ
San Saba River - San Saba	Winter	Subsistence	X	X	X
Colorado River - Bend	Spring	Base Low	X	X	X
Onion Creek - Driftwood	Summer	Base Medium	X	X	X
Lavaca River - Edna	Fall	Base High	X	X	X
Navidad River - Edna		2 Pulses per season	X	X	X
		1 Pulse per season	X	X	X
		1 Pulse per year	X	X	X
		1 Pulse per 2 years	X		
		1 Pulse per 5 years	X		
		Other	X		

Methods

- Sample each site seasonally under base flow and following a flow pulse (but at base flow)

- Quantify fish in riffle, run, pool, and backwater habitats

- Quantify macroinvertebrates in riffle habitats

Example predictions:

↑ Flow tier ↑ proportion of fluvial species

↑ Flow tier ↑gut fullness and condition (health) of fishes

Summary - Colorado Basin

- 16,000 macroinvertebrates
- 95 samples, 31 species, 3,447 fishes

Habitat	N
Riffle	16
Run	16
Backwater	13
Pools	6

Tier	N
Subsistence	
Base	7
4 / Season	
3 / Season	
2 / Season	7
1 / Season	4
1 / Year	2
1 in 2 Years	
> 1 in 5 Years	

Summary –Col, GSA, BRA 2014 - 2017

- 75,000 macroinvertebrates
- 35,000 fishes

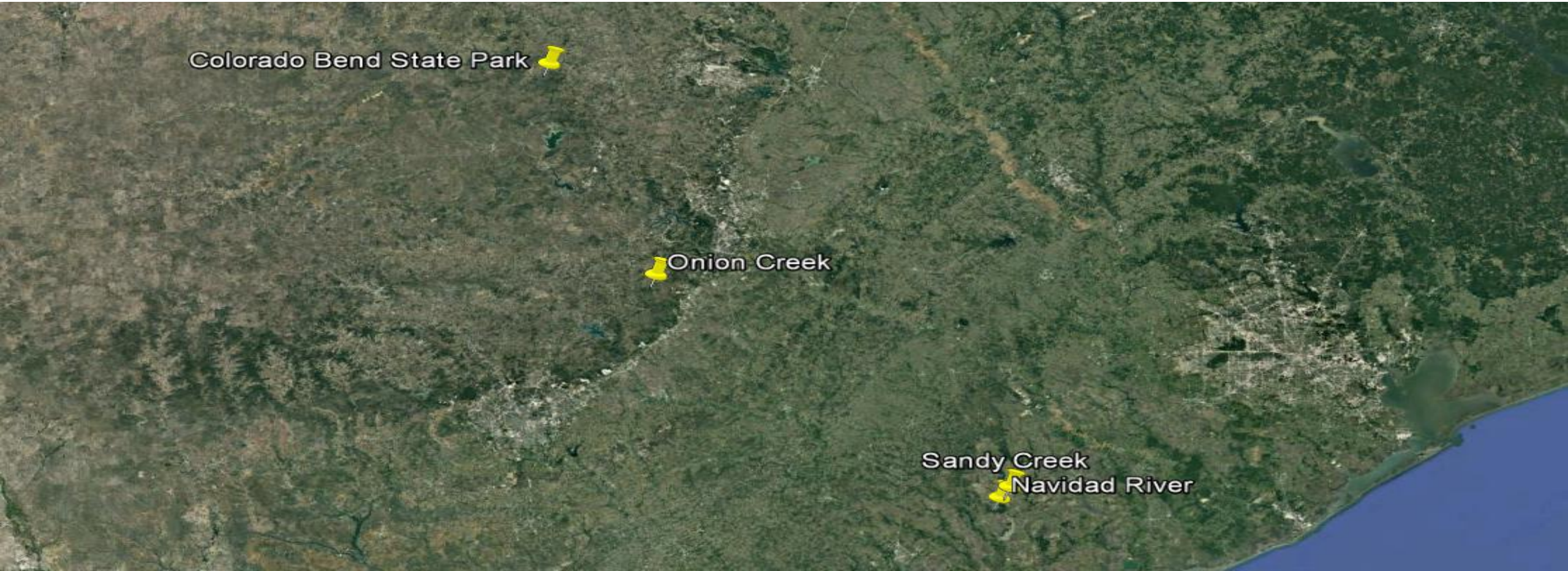
Habitat	N
Riffle	112
Run	110
Backwater	43
Pools	43

Tier	N
Subsistence	7
Base	84
4 / Season	16
3 / Season	16
2 / Season	71
1 / Season	67
1 / Year	21
1 in 2 Years	1
> 1 in 5 Years	18

Four Sites Completed in Fall of 2016

Colorado Basin
-Colorado Bend
-Onion Creek

Lavaca Basin
-Navidad River
-Sandy Creek

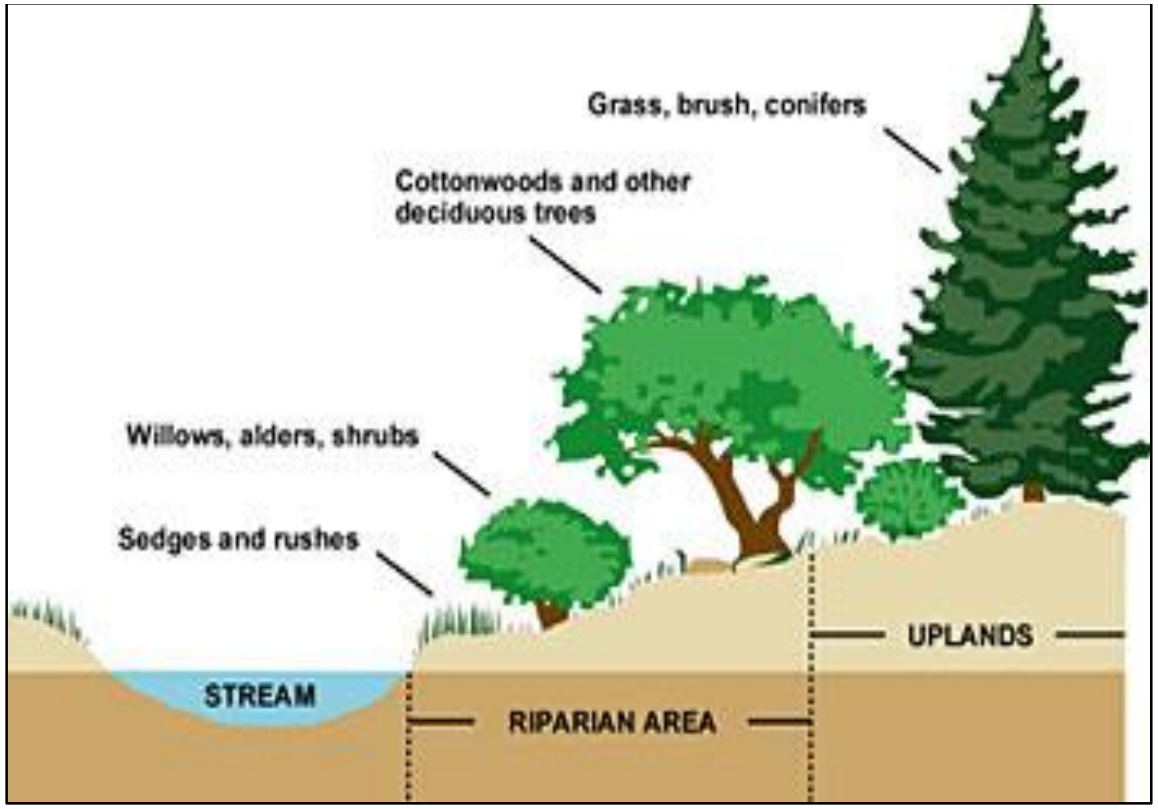


Riparian Community Sampling

-Three tiers were created parallel to the river channel based on elevation.
-30-35 of 75 random points in each tier selected for data collection.

Riparian Community Sampling

-Data was collected in 2 m X 2m plots along with GPS coordinates
-Quantity of each tree species and class (seedling, sapling, mature)
-DBH of all trees > 2”
-Dominant herbaceous and shrub species



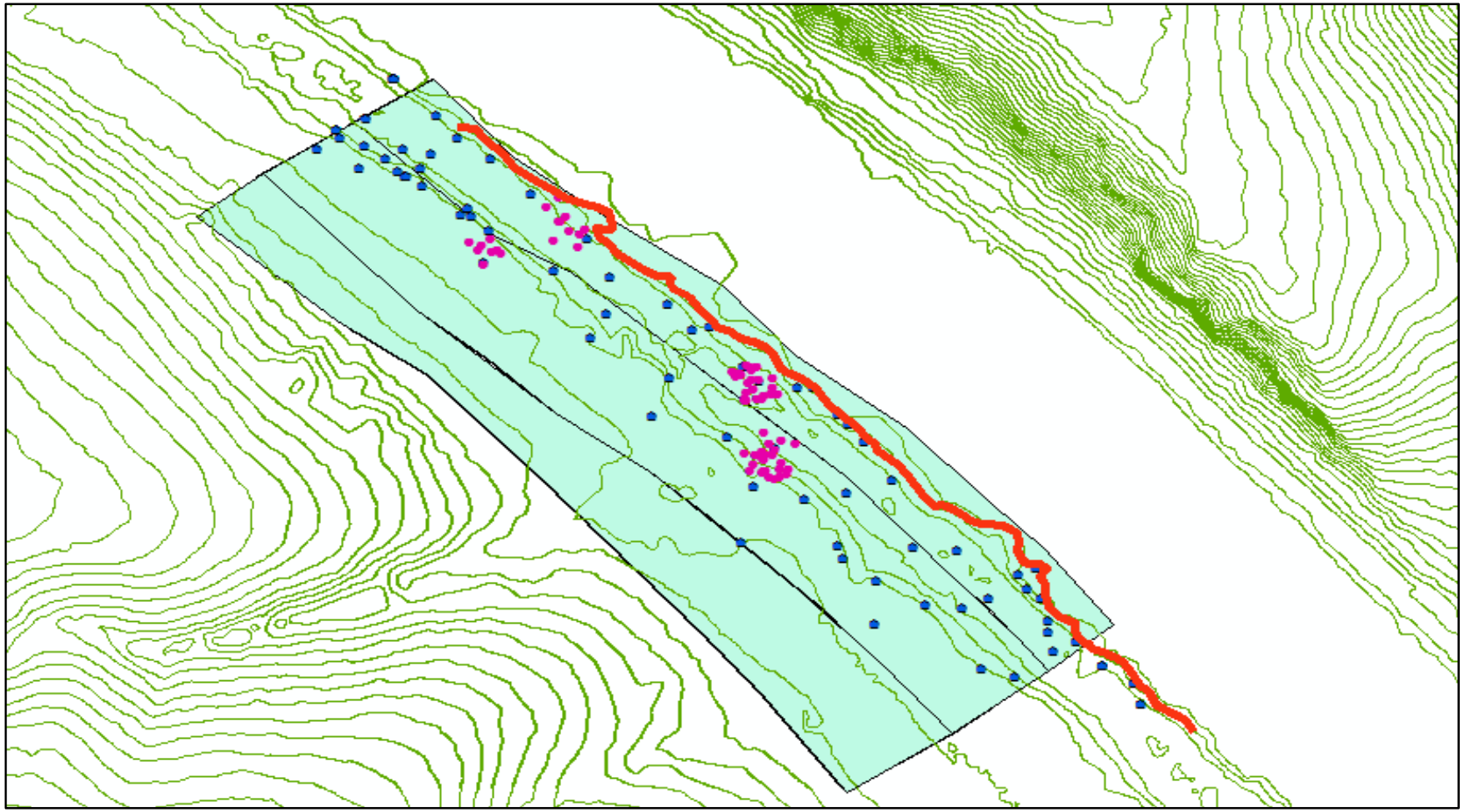
Mature Tree Community

-Random points were also used to select the centroid for 37 ft diameter circular plots in which the DBH of all mature trees was measured

Topographical Data

-Rivers edge mapped during the sampling period

-Elevation contours added to link inundation levels

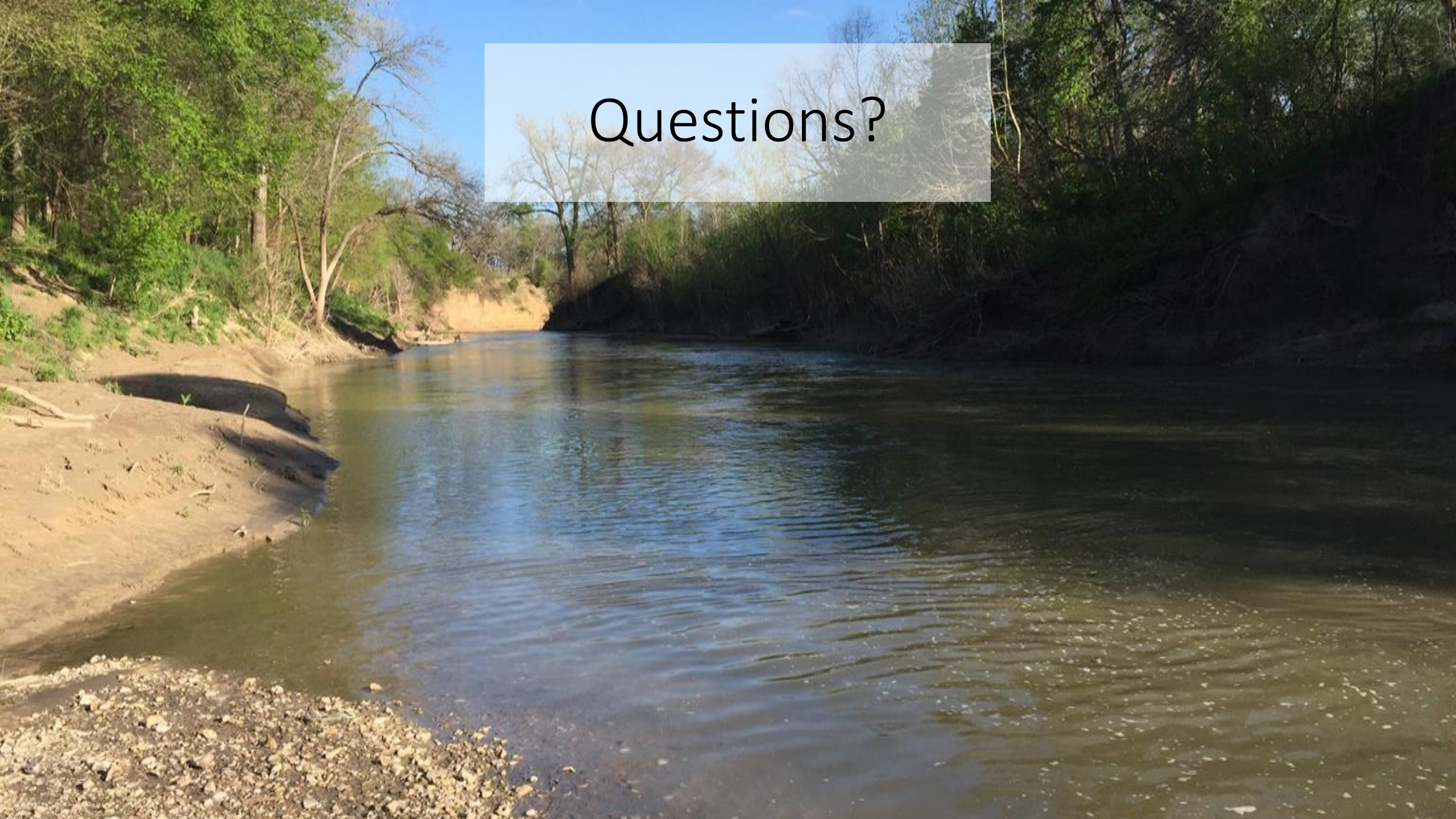


Schedule and Deliverables

- Collections continue through Spring 2017
- Data compilation, analysis, and report preparation
- Draft report in late summer

Schedule and Deliverables

- Will include Validation Methodology Tool
  - Enable stakeholders to evaluate standards as more information becomes available in the future
  - “Biological Water Quantity” methodologies


Questions?